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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 121



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ARGENTINA

BRIEFS

URANIUM DEPOSIT EXPLOITATION--Cordoba, 28 Sep (TELAM)--A spokesman for the National Atomic Energy Commission has announced that the Los Gigantes uranium mine will probably start production in the middle of 1982. Its initial yield is estimated in 100 tons of concentrated ore. [Buenos Aires TELAM in English 1100 GMT 28 Sep 81 PY]

CSO: 5100/2017

BRIEFS

ANGRA I POWERPLANT RECEIVES NUCLEAR CHARGE--Rio de Janeiro--With the loading of the first uranium charge in the Angra I nuclear power station, Brazil entered the nuclear age. It could still take many months between loading and actual generation and commercial utilization of nuclear generated electricity but one official of Westinghouse, the American company that built Angra I, told Brasil energy "...this is the end of the construction phase and the beginning of the operational phase." Even though the loading was four years behind schedule it took place during an elaborate inaugural ceremony attended by high ranking government officials including Mines and Energy Minister Cesar Cals, ELETROBRAS President Costa Cavalcanti, Furnas [Electric Company] President Licinio Seabra and others. The actual loading amounted to placing 121 elements, totaling 50 tons of enriched uranium into the core of the reactor. When fired-up, or heated-in a gradual process that is scheduled to start in November and become fully operational by next March--the plant should have the capacity for producing 626 MW which will feed electrical current into the Furnas power network in southeast Brazil. A critical pre- and post-firing test still has to be run to check out the functioning and safety of the equipment before steam is actually produced to turn the generator and produce an electric current. That means that the firing will only take place in November if everything works out perfectly according to plans. The four year delay in the inauguration indicates things are not working out according to the nuclear plan. Delays in construction and faulty equipment were blamed for Angra I being so far behind schedule. [Text] [PY091514 Rio de Janeiro LATIN AMERICA DAILY POST in English 8 Oct 81 p 7]

URANIUM PROCESSING--If the processing of the uranium ore from the country's largest deposit found in Ceara were to be made in Bahia, it would cost \$120 million. But since the decision was made to build an industrial complex in Ceara, including a nuclear plant to supply energy, that cost will be \$5 billion. The most weighty political argument in dealing with the question is that "the uranium from Ceara will never be processed in Bahia." The Itatiaia industrial complex will be built in two phases, according to information technicians of the nuclear sector gave yesterday in Rio de Janeiro. In the first phase in 1983, a pilot unit will be installed to develop the process for concentrating uranium in the form of yellow cake. This will take a year. By mid-1985 the second phase will begin with the construction of a complex for production of yellow cake on an industrial scale. Construction of this industrial complex will be completed in 2 years. [Text] [PY092109 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 6 Oct 81 p 1]

MEXICO

BRIEFS

URANIUM SHIPMENT RECEIVED--The National Nuclear Research Institute has received the first shipment of enriched uranium, which had been embargoed by the United States. The uranium weighs 2.5 kg [as heard] and has an estimated cost of 5 million pesos. However, the person in charge of the nuclear reactor installed by the organization in Salazar in the State of Mexico, denied that the uranium had been embargoed by the United States. He explained that what had occurred were bureaucratic problems. The necessary packing for the physical protection of the uranium was made up of three containers weighing 500 kg and this is the first shipment. The second shipment will be made next week. [Text] [PA131934 Mexico City International Service in Spanish 0300 GMT 10 Oct 81]

CSO: 5100/2017

BRIEFS

IAEA LOAN FOR 1982 PLANS--The International Atomic Energy Agency [IAEA] has approved projects related to the Uruguayan nuclear program, including technical assistance amounting to \$218,000. Thus, the development of national nuclear projects will be supported during 1982. Meanwhile, the 25th General Conference of the IAEA will close today. It began on 21 September at the organization's headquarters in Vienna after the governors had held their own meeting. Luis H. Meyer, the Uruguayan governor, attended these meetings. [Excerpt] [PY151109 Montevideo EL DIA in Spanish 26 Sep 81 p 8]

CSO: 5100/2018

BRIEFS

URANIUM DEPOSITS DISCOVERED--Cairo, 17 Oct (MENA)--Field studies conducted by U.S. and Egyptian experts indicate the existence of 7,000 sites in Egypt containing deposits of the nuclear raw materials uranium and thorium. The National Center for Remote Sensing also participated in these studies. In today's edition, AL-AHRAM says that the comprehensive satellite survey covered about 200,000 square kilometers and that it has confirmed the existence of 50 sites in which uranium production seems economically feasible. Detailed studies have been made on four of these sites. Geological missions have discovered about 20 uranium "veins" embedded in granite boulders along the Qinah-Safajah Highway. They are estimated to contain a reserve of about 5,000 tons of raw uranium. Studies have also indicated that the confirmed uranium reserves of Egypt amount to around 14,700 tons. [Text] [NC170824 Cairo MENA in Arabic 0640 GMT 17 Oct 81]

CSO: 5100/2017

NUCLEAR-PLANT WASTE TO BE BURIED IN ROCK

Helsinki HELSINGIN SANOMAT in Finnish 27 Sep 81 p 29

[Article by Risto Valkeapaa: "Nuclear Waste To Be Buried in Bedrock"]

[Text] Workers are furiously boring holes into bedrock at Loviisa and Eurajoki for the permanent and secure burial of dangerous radioactive waste from nuclear power plants.

Basic work, from the point of view of nuclear waste treatment, is being accomplished in autumn winds and rains on the island of Haltholmen at Loviisa and on the Ukopaa Peninsula of Eurajoki's Olkiluoto.

Drilling in the bedrock goes on from early morning until late at night, and a final location is being sought for a large cave for the final disposition of nuclear-power plant waste.

A final disposal site is part of the terminology of nuclear power people and means a place where radioactive waste can be stored with the certainty it will never bring harm to anyone.

Thus, a study is being conducted on a place where power plant waste can be deposited. This, for its part, is the refuse created during the operation of a power plant: rags, sawed-off pieces of plank, and active liquid substances. All this refuse will be poured into concrete before it is deposited in the cave. At Olkiluoto it will be packaged in bitumin.

As far as power plant waste is concerned, the most radioactive will not be safe for the environment until 500 years from now. The guaranteeing of safety means a challenge to the engineers.

It is also apparent that discharge waste from the plants will also be deposited in the same cave. For the time being, no one can say to what degree the nuclear power plants will in time be dismantled, but apparently the innermost portion of the cave will be the disposal site for the plant's pressure vessels. After spent fuel, they are the most active portions of a nuclear power plant. The pressure vessels will remain dangerous to the environment for at least 1000 years.

The fact that the darkness of night does not even stop the progress of work attests

to the tight work schedule. The power companies are not wasting any time. The tight work schedule has resulted in the fact that the last holes are already being drilled at Loviisa, for example. These holes will locate the final spot for a cave 200,000 cubic meters in size.

On the drawing boards it is drawn to a depth of 120 meters below sea level. Approximately the same amount of rock in meters will cover the waste. The refuse will be sent down a 1-kilometer chute.

The plans of Teollisuuden Voima [Industrial Power] are not as clear-cut as those of Inattra Power. Analyses conducted on the flow of water will after a few months determine whether a portion of the storage area should be made into underground silos.

Swedish Example Accelerates Work in Finland

Teollisuuden Voima's problem has been fissured bedrock. It has not been possible to find a large enough area of rock mass composed of the same kind of rock on Olkiluoto's Ulkopää Peninsula. Rock fissures, for their part, are not satisfactory since radioactivity can travel along them to the earth's surface.

However, there are no significant differences in the time schedules of the Finnish power plants. The research phases of both the plants should conclude by the end of next summer, when the reports on the final disposition of nuclear waste with respect to both plants will be completed. A decision concerning the continuation of this project will be made on the basis of these reports.

However, it already appears that a continuation is a foregone conclusion. Both power companies have announced that their caves will be ready for test use in 1986.

In the planning of these caves for the dumping of waste, Finland is running even with its favorite international competitor, Sweden. They are running neck and neck toward the chalk line of the final solution. Sweden intends to have its cave, to be constructed in Forsmark, ready for experimental use toward the end of 1987. All of that country's nuclear power plant waste will be concentrated in the Forsmark cave.

Concerns about waste in Sweden are completely different than those in Finland, there are 12 nuclear power plants in operation in Sweden. The accumulated waste already amounts to 7,500 cubic meters and threatens to increase to 40,000 cubic meters by the end of this decade. The Finns have only small amounts of waste: we have only 230 cubic meters stored in a solidified form.

Then why this spurt of competition?

The fundamental reason is, of course, Finnish legislation and usage permits. They comprise the basis of a program, which is now being accomplished without any delays.

In the background, however, is the threat of matters becoming complicated as the worst imaginable impetus. Finnish nuclear power experts know the situation in Sweden well and its effects on the nuclear power industry.

A heated nuclear power debate in Sweden resulted in a conditional law and a referendum. The conditional law culminated in a principle of complete security and the referendum meant that no new nuclear power plants can be built in Sweden.

The principle of complete security, for its part, makes all construction connected with nuclear power expensive. It forces the Swedes to make fairly expensive decisions in order to guarantee progress.

Debate Smolders Under the Surface

The Finns have become accustomed to the fact that issues come slowly but surely across the gulf on a Swedish boat. It is expected that the same will happen with respect to nuclear power thinking.

A nuclear power debate is already smoldering beneath the surface in Finland. The nuclear power people instinctively feel that it is coming and they even approve of it. Managing Director Magnus von Bonsdorff of Teollisuuden Voima, among others.

A discussion is being conducted on economic issues relating to nuclear power, but we have not yet had reason for the Swedish-type large-scale debate, states Bonsdorff.

But what could then bring this smoldering debate above the surface? It could, of course, flare up unexpectedly, but it would be strange if the next large power plant decision does not arouse some kind of a discussion. Imatra Power has stated publicly that a decision will be made in the middle of 1983.

In the final count, nuclear power issues will be weighed by something other than a paperweight. If, indeed, an extensive discussion occurs, it cannot help but complicate the issue. This is also one important reason for resolving the nuclear waste problem without any delays.

The Swedish example has already demonstrated that social pressure can introduce completely new factors into planning. The engineering skills will no longer resolve everything. Economic calculations are also beginning to raise complications.

Sweden Rejects Drilled Well Theory

Within the circle of experts, the issue of the final disposal of nuclear waste is not considered to be the most difficult technical issue connected with nuclear power -- rather that problem is close to being resolved.

But in the opinion of the Finns, Swedish engineers have succeeded in making it more difficult than is perhaps necessary. The effects of extraordinary pressures caused by society, for example, are also seen as a factor in this.

The Swedes are planning the construction of waste storage caves under the sea to ensure that they will be protected from all outside influences. In the background is the drilled well theory according to which the risk of outside effects is greater on dry land than at the bottom of the sea. The Finns intend to make their caves under dry land. Finnish experts say that the Swedish plans deviate from general safety thinking prevailing in the world.

Going under the sea also means an increase in costs. Field tests alone become more expensive when they have to be conducted from a floating raft.

It is also not completely certain that the Swedish solution is better from the point of view of safety. A joint Nordic study concluded in the middle of September, arrived at the conclusion that risk studies did not demonstrate any clear differences between disposal locations.

The study is the result of 4 years of work. It is a joint Nordic study, which has also promoted the creation of a common language in the Nordic nuclear waste discussion.

Finland was represented in the study by the State Technical Research Center, which also compiled it. The Finnish planner in the study was Doctor of Engineering Heikki Reijonen of the Electrical and Atomic Engineering Laboratory of the VTT [State Technical Research Center].

Where will the Swedish thinking lead? At this time, at least, it is guaranteeing a feeling of security for the people. They intend to put steel and concrete into Forsmark cave so that flow studies of the type we are conducting will not in practice be needed at all. With this system radioactivity will remain contained without packaging, say the experts.

In spite of far-reaching plans a final solution has still not been reached in Finland. It will still be influenced by the Loviisa and Eurajoki decisionmakers in the construction phase and naturally by the Radiation Safety Institute.

The word of the people and officials will also be considered. But in order that the question of power plant waste does not become sidetracked, researchers point out that its final disposal does not involve significant risks.

The significance of safety in the final disposal of nuclear waste is nothing compared to the risks that could occur as a result of operational disturbances, for example.

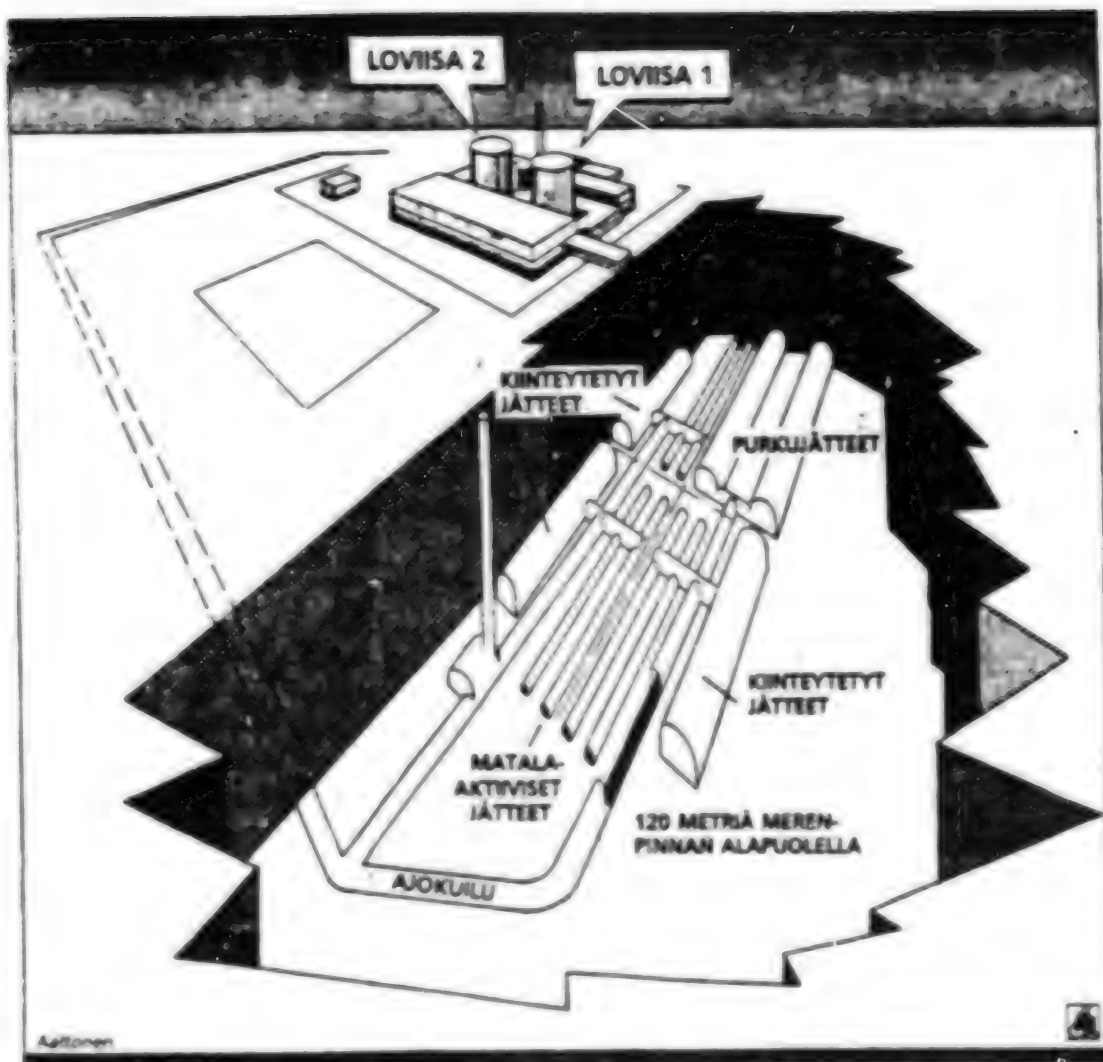


The Swedes intend to bury waste under the sea. Finnish experts believe this solution deviates from general safety thinking.

Key:

1. 6 meters of water
2. 50 meters of rock

3. Waste
4. 1,400 meters



Waste storage caves will be dug into the island's bedrock. The various types of waste will be segregated into their own sections. In the drawing the cave is drawn to a larger scale than the nuclear power plant.

Key:

1. Solidified waste
2. Discharge waste
3. Low-active waste

4. 120 meters below sea level
5. Chute



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Jouni Konttila drills the final holes at Hastholmen.

10576
CSO: 5100/2006

FUTURE ENERGY SOURCES TO INCLUDE LARGER NUCLEAR COMPONENT

Madrid LUZ Y FUERZA in Spanish Jan-Feb 81 pp 45-53

[Article by Eduardo Díaz del Río, Doctor Engineer of Roads, Canals and Ports (Spanish Atomic Forum); Vicente Gil Sordo, Engineer of Roads, Canals and Ports, and Certified in Economic Sciences (Electric Unit, SA); and Manuel Lopez Rodriguez, Doctor of Sciences (Nuclear Energy Board): "The Nuclear Electric Component in the Progress of Spanish Society"]

[Text] General Comments on the Spanish Energy System

Like other countries with a great energy dependence, Spain is an example of poor balance between the supply and demand for energy, and hence has a slight margin of flexibility. This fact necessitates making decisions aimed at reducing the dependence on foreign countries for energy.

The most prominent features of our energy system are:

- a. Up until recent years, the existence of a high degree of elasticity in the energy demand with respect to the GDP.
- b. An insufficient level of activity in energy exploration.
- c. A heavy dependence on foreign countries for our supply, particularly that of oil, which is the main element in the lack of equilibrium in the balance of payments.
- d. The level of energy prices, lower than the average for Western Europe, especially in the sectors of industry and transportation.
- e. Insufficient technological development.

The government submitted to the Spanish Parliament an Energy Plan covering the next decade, which was approved by this entity in July 1979. This Energy Plan follows guidelines similar to those implemented in the OECD countries. The most significant points in this plan are:

The prices of energy and conservation measures are the key element for curbing consumption during the period covered by the plan. There is a tendency toward a system of real prices, eliminating support for certain consuming sectors.

The plan encourages an increase in the activities relating to exploration of national energy sources.

This plan is also aimed at diversifying imports of energy supplies.

A considerable percentage of the future demand for electric energy will be met through the use of nuclear powerplants. For this reason, important decisions have been offered relating to the structure of the Spanish nuclear industry and the agencies regulating it.

The investments anticipated for the first 4 years of the plan are in excess of \$9.5 billion, 66 percent of which is associated with the electric subsector.

This Energy Plan intends to change the trend followed by the Spanish energy system for the past 15 years, which may be summarized as follows:

The rapid Spanish industrial development from 1964 to 1973 led to an excessive consumption of energy with respect to the amounts generated by the GDP. During that period, and in the OECD nations, the GDP increased by 4.8 percent, energy consumption, by 5.2 percent; and energy elasticity/GDP, by 1.1 percent. In Spain, those figures were 6.6, 8.9 and 1.4 percent, respectively. During recent years, the coefficient of energy elasticity/GDP has been quite variable in Spain, a behavior stemming from the energy crisis. The high figures reached by the Spanish coefficient of energy consumption elasticity/GDP must be reduced so as to approximate the figures reached by that coefficient in the OECD countries.

Spain's dependence on foreign countries for energy has increased since 1963. In that year, this dependence amounted to 38 percent; however, in 1976 the dependence on foreign countries totaled 76 percent.

Insofar as the electric sector is concerned, the most prominent features of the plans for electric energy are:

Hydroelectric energy will have to undergo a moderate increase, owing to the increasing cost of this almost marginal utilization. The increase for installing this equipment in power has proven greater than that of energy, mainly because part of that power relates to pumping facilities and over-equipping with machines to regulate production.

Coal will have to increase greatly until it meets a quarter of the total needs. This increase would come partially from brown and black lignites with a high sulfur content, which would necessitate the adoption of corrective measures to prevent the deterioration of the environment that such types of products might cause. Imported coal will be used to supplement the domestic production.

The contribution from nuclear energy must also increase rapidly, supplying 37.7 percent of the total demand by 1987. That figure represents 14.8 percent of the total consumption of primary energy.

The production of electricity using fuel oil must decline considerably, from the current 30 percent until it accounts for only 11 percent of the total electric

energy required by the end of the period. The fuel oil powerplants will play a reserve role to deal with circumstances not anticipated in the exploitation programs (greater increase in demand, lag in the nuclear construction, situations involving low water supplies, etc.).

The necessary regulation of the natural gas system or the anti-pollution restrictions make it certain that, on occasion, variable amounts of natural gas will be used in certain thermal powerplants.

On the basis of the preceding comments, it may be predicted that, by the year 1990, the structure of the Spanish consumption of primary energy will be as indicated

Year 1990	Percentage (%)
Hydroelectric	8.1
New types of energy	1.4
Coal	19.6
Fuel oil	48.4
Natural gas	6.0
Nuclear energy	16.5
Total:	100.0

In the rest of this article, we shall discuss the role that nuclear energy will play in the Spanish energy system in the future.

2. The Nuclear Powerplants in the Spanish Energy Plan

At the present time, three reactors are operating in Spain with a power of 1,120 MW. Another seven units with a power of 6,555 MW are in an advanced stage of construction. Final permits have been granted for the construction of three additional reactors with a total power of 2,950 MW. Finally, the administration has decided to propose the authorization of two more reactors with a power of 1,980 MW. This authorization will not go into effect until it has been studied by the Nuclear Safety Council, a newly created agency. Thus, by 1990 there will be a nuclear system available with a power of about 15,500 MW.

As we shall observe later, up until now the activities associated with nuclear safety have been incumbent on the Nuclear Energy Board, an agency which is also engaged in research and development areas included in the field of peaceful uses of nuclear energy. However, the tasks called for by the National Energy Plan include the creation of a Nuclear Safety Council as an independent agency concerned with nuclear safety.

3. Importance of Nuclear Energy in the Spanish Energy System

During recent years, the discussions about the future development of nuclear energy have become increasingly frequent.

In this section, an attempt has been made to evaluate to some extent the role which nuclear energy will play in Spain's energy system. This evaluation requires an

analysis of the Spanish energy system over a long period of time. Because of this, the development of that system has been studied over a period of time covering the next 40 years. During this time, it will be necessary to make major decisions, such as those relating to the storage and use of burned uranium, the use of generator reactors, improvements in the efficiency and capacity of uranium enrichment processes, etc., depending on the need for such decisions.

In order to analyze the change in the role played by nuclear energy in our energy system, certain questions must be answered, such as the following:

What is the importance of the role played by energy in the growth of the Spanish economic system?

What savings of energy could be achieved if a decision is made for a complete nuclear alternative, as opposed to another based essentially on coal?

What are the uranium reserves in the world, and how are they distributed?

What is the impact of nuclear energy on the environment, and what is its importance when compared with that caused by the use of coal and other alternative sources?

Could a final solution be found to the problem of nuclear waste?

All these questions are currently being debated on an international level, and hence in Spain as well. At the present time, all nations need to find new energy sources, because the massive use of oil and natural gas is constantly reducing the resources for these fuels. The total coal and uranium resources are probably larger than those currently estimated; and after the year 2020, solar energy and that from fusion may provide almost unlimited amounts of energy. If these suppositions become a reality, the world (and hence Spain as well) will again have abundant energy; although the costs will be far greater than those to date. Therefore, the very long term energy problem is more a problem of costs and of supplies.

As has already been noted, Spain's energy resources are very slight (at present, approximately 70 percent of the total energy consumed is imported). This has caused the major problems posed to be those related to security and diversification of the energy supply, and those affecting the equilibrium in the balance of payments. For this reason, it may be claimed that nuclear energy will play a major role during the next 30 or 40 years.

In this study, an analysis is made of the impact that could be caused by a restriction on the availability of nuclear energy. Moreover, we should not forget that the security of the energy supply over the long term will probably lead to the adoption of the nuclear alternative; because this action offers advantages for the countries which depend heavily on foreign nations from an energy standpoint. One of the main advantages is that the uranium stocks are more manageable and less expensive than those associated with oil. In addition, by using regenerator reactors, it is possible to attain a high degree of independence in energy supplies.

To assess the economic impact that a restriction on the use of nuclear energy would have on the Spanish energy system, two scenarios have been studied: In the first,

which we shall assume to be the Base-Case, there is a consideration of the hypotheses that are thought to be most likely concerning the evolution of prices of the various types of energy, date of availability and rate of implementation of new types of technology, technical-economic features of these new types of technology, increase in demand, etc. The second scenario, called Lin-Nuc (nuclear limitation), offers a situation with limitations on the use of nuclear energy; and the hypothesis considered is that only the units under construction or with a prior permit will be incorporated into the Spanish energy system.

Understandably, the entry of these groups has been assumed, in view of the enormous investments already made in them. So it is assumed that, after the year 2000, no further reactor, whether conventional, advanced or regenerator, will enter.

The comparison of results between these two scenarios during the time period from 1980 to 2020 has made it possible to quantify the economic impact that would occur on our energy system if we had to replace nuclear energy with more expensive types of technology.

In order to carry out this study, we used the MARKAL model which has been developed simultaneously by the Brookhaven Laboratories (U.S.) and at Juelich (Germany). Many of the features of this model come from energy models already in existence at these laboratories, such as the BESOM * and DESOM ** at Brookhaven, and the KFA Energy Supply Optimization Model *** at Juelich. However, the MARKAL model introduces major changes to meet the specific requirements of this project, carried out in the International Energy Agency. The version of the MARKAL model used was that associated with Juelich.

In the following paragraphs, there is a comparison of the most interesting results accrued in the two scenarios considered. If the Base scenario is taken as a reference point, the following comments may be made:

The structure of the consumption of primary energy undergoes major changes. Basically coal, and to a lesser extent natural gas, are the types of energy that replace the lesser contribution from nuclear energy. There is also an increase in oil consumption, but the percentage of increase is really due to the fact that, when the types of technology involving nuclear gasification of coal disappear, there is an increase in the need to import crude for the production of LPG for the residential and commercial sector. The increase in natural gas imports replaces the production of synthetic gas, also derived from nuclear gasification technologies.

* Brookhaven Energy Systems Optimization Model (BESOM), E.A. Cherniavsky, BNL-1959, December 1974.

** "A Dynamic Time Dependent Model for the Analysis of Alternative Energy Policies" W. Marcuse et al (in : K.B. Haley, et al, Operational Research 1975, North Holland Publishing Company, 1976).

*** The KFA Energy Supply Optimization Model and Its Underlying Software Concept, Internal Paper, G. Egberts, KFA Juelich, June 1977.

On the other hand, coal imports increase drastically starting in the year 2000. In 2020, coal imports double those for the Base-Case (during the entire period, the overall increase is about 50 percent). Natural gas also increases starting in the year 1990 (approximately 900 PJ * more than in the Base-Case). However, after the year 2010, gas imports start to decline.

The structure of the final energy consumption does not vary much from one scenario to the other. The participation of liquid fuels rises slightly between 1995 and 2010 (the annual rate of increase is approximately 1.5 percent). Electricity consumption remains virtually constant, and that of renewable forms of energy shows a slight increase, only during the final years (about 10 percent). The participation of gaseous fuels in the total final energy consumption declines somewhat. From a sectorial standpoint, it may be said that in the industrial sector changes similar to those previously described for the total consumption appear: In the residential-commercial sector, there appears to be a slight decline in gas during the last 10 years of the period studied, which is offset by an increase in the use of gas heat pumps. Understandably, the transportation sector does not show any major changes between the two scenarios.

The total electricity consumption remains very similar in both scenarios, but its production structure undergoes major changes. The decline in the consumption of electricity of nuclear origin is covered chiefly by coal. For the final years, this replacement is compensated for, either by conventional coal thermal powerplants (which absorb about 80 percent of the reduction in the production of electric energy of nuclear origin), or by combined cycle powerplants (which absorb about 15 percent), and the rest (5 percent) is covered by in situ gasification and solar powerplants. The high temperature and regenerator reactors do not appear in the Lin-Nuc scenario (as has already been noted), and natural uranium is used throughout the period for each scenario.

The total production of synthetic fuels from coal is reduced to at least half of that in the Base-Case, owing to the disappearance of the technologies for coal gasification combined with the high temperature reactors. This reduction is not major, owing partly to the increased activity in the Lin-Nuc scenario of the Lurgi-Brown lignite gasification process, and the entry of a new technology, the gasification of coal to produce gas with medium heating power. Finally, methanol production hardly changes.

Finally, we shall analyze the economic repercussions which these changes cause in the Spanish energy system. Table II shows the differences in costs of extraction, importing, investment, maintenance, exploitation, transmission and distribution for the energy system in each of the two scenarios presented, and for several years of the period studied. In order to give an idea of their magnitude, the difference between the total costs of the two scenarios has been related to the estimated GDP. Although the figures will vary according to the hypotheses adopted, some very important conclusions can be drawn concerning the increase in cost over the long term that would be entailed for the Spanish economic sector by not using nuclear energy at levels higher than those established in the Lin-Nuc scenarios. For example, in Table II one notes that, from the year 2000 to 2020, the difference

*1 PJ = 10^{15} Joules.

in cost between the two scenarios increases from 0 percent to 1 percent of the G.D.P. (assuming approximately an average increase of 0.50 percent of the GDP per year), a figure which is really quite sizable.

Naturally, this increase in the costs of the energy system has a great impact on the country's economic system. Studies made in highly developed countries (the United States, Germany, etc.) indicate that slight increases in the energy costs can be absorbed by the economic systems of those countries without causing very serious upsets. Now then, in countries which are not so developed as the ones mentioned (this applies to Spain), the impact is far greater, because these countries need to continue making considerable increases in the rate of their energy consumption. This is due to the fact that, in such countries, the rate of economic growth is still closely linked with their energy consumption, owing to the requirements for expanding their basic industry and their transportation sector. In Spain, a country with meager energy resources, the problem is even worse when one considers the equilibrium in the balance of payments. According to the Lim-Nuc scenario, Spain would have to import fuel at higher prices, which would cause major problems in the foreign trade balance.

Moreover, if all the developed countries of the International Energy Agency were to choose an alternative equivalent to the nuclear limitation (Lim-Nuc) scenario, it would cause a drastic increase in the demand for coal. Because the coal producing countries could not achieve parallel increases in the supply of their coal, there would appear a speculative coal market similar in nature to what is occurring at present with oil. Even if these developed countries were to choose scenarios equivalent to the one presented as Base * in this report, it would be necessary to develop a major infrastructure in the areas of coal production and transportation.

Finally, another aspect that should be stressed is that of security in the supply of energy. An energy shortage could bring about very serious consequences in an economic system; and hence there must be the greatest possible margin of security in the supply. As has already been stated, nuclear energy increases to a very large extent the security for supply in a country with the energy features of Spain.

Based on all the foregoing considerations, it may be claimed that the increases in energy costs in the energy alternative entailing limitations on nuclear energy would have a very heavy impact on the rest of the economic system; in other words, there would logically occur a rise in the unemployment rate, lower production, and hence a lower rate of economic growth. A quantitative evaluation of these impacts on the Spanish economic system would be very interesting; however, such an analysis transcends the goal of this report.

4. The Nuclear Fuel Cycle

The starting of the Spanish nuclear program has required the creation of an infrastructure that will guarantee the nuclear fuel factor in each phase of its cycle. The two entities responsible for this activity are the Nuclear Energy Board (JEN) and the National Uranium Enterprise (ENUSA).

* See the results of the MARKAL project of the RD & D Committee of the International Energy Agency, January 1980.

Since its creation, JEN has been engaged in uranium prospecting and the development of the technology for the different phases of the nuclear fuel cycle. ENUSA was created in 1972, and the mission assigned it was the industrial activity and the unified management of the fuel cycle. It was subsequently entrusted with uranium prospecting outside of Spain, while JEN remained in charge of the prospecting on national territory.

The present National Energy Plan (PEN) regulates the cooperation between the two entities, JEN and ENUSA. ENUSA is responsible for the uranium prospecting both inside and outside of Spain, in addition to all the industrial activities and the management of the fuel cycle. JEN prepares the technological research and development programs which will serve as a backup for ENUSA's industrial activities. In accordance with PEN, the state will retrieve ENUSA's private capital to give to JEN. In this way, JEN will become an ENUSA stockholder.

The current status of the different phases of the fuel cycle is as follows:

Uranium Concentrates

Spain's uranium reserves amount to some 20,000 tons of U_3O_8 which could be exploited at a cost of under \$30 per pound. Added to these reserves are resources amounting to 40,000 tons of U_3O_8 contained in uranium-bearing lignites, the exploitation of which poses technical problems that would increase the extracting costs to over \$50 per pound.

In 1974, the government established a 10-year National Uranium Exploration Plan, run by JEN. This plan made it possible to increase the prospecting activities considerably. In addition, ENUSA is engaged in prospecting abroad (Colombia, Canada and South Africa).

At the present time, the production of uranium concentrates in Spain is about 225 tons of U_3O_8 per year, adhering to a technology totally developed by the Nuclear Energy Board. Of this number, 125 tons are produced at the plant which ENUSA owns in Ciudad Rodrigo (Salamanca), and the rest is produced by JEN at its plants in Andujar (Jaen) and Don Benito (Badajoz). The present program calls for an increase in the production of uranium concentrates to 800 tons of U_3O_8 in 1982, using a new facility to be built at Ciudad Rodrigo, and through the industrial application of a process developed by JEN for extracting uranium from phosphates.

To complete the supply to meet our needs for concentrates, ENUSA, in cooperation with the French Atomic Energy Commission and a Japanese company, Cominak, has begun exploiting uranium-bearing deposits in Niger. ENUSA has also carried out negotiations that have enabled it to sign supply contracts with Canada and South Africa. This fact insures the meeting of Spain's requirements beyond 1987.

Moreover, in June 1979 two international consortiums were formed for research on, and exploitation of uranium:

The Spanish state shares in the first of these consortiums with a participation of 40 percent, the American firm Chevron has another 40 percent, and the Spanish private enterprise "Natural Resources Promotion" has the remaining 20 percent.

The consortium will investigate the uranium resources in Catalonia and Extremadura, over an area of about 6,000 square kilometers.

The Spanish state also shares in the second consortium, with a participation of 45 percent; Exxon Mineral Spain, Inc has another 45 percent; and Mediterranean Petroleum (PETROMED) has the remaining 10 percent. This consortium will investigate two geographical areas in Castilla la Vieja and Aragon, with an initial area of some 20,000 square kilometers.

In both consortiums, the Spanish state reserves the right to purchase (at international prices) all the minerals produced. Therefore, there is no possibility of exporting minerals unless the Spanish state expressly agrees to it.

These consortiums have been promoted directly by the Spanish administration, with the twofold purpose of obtaining foreign and private Spanish financing in this sector.

Uranium Enrichment

To date, Spain has not engaged in any activity associated with uranium enrichment facilities, and hence its needs, the management of which has been assigned to ENUSA, are being met through contracts with foreign countries or participation in multinational firms. There are three sources of supply: the United States which, thus far, has met all our needs; the USSR, through two contracts with Technabexport; and, finally, Eurodif, a firm in which Spain has a participation of 11.1 percent. Between the contracts and the participation in Eurodif, the enrichment service has been assured until beyond 1987.

Manufacture of Fuel Elements

At the present time, the fuel elements used by the Spanish nuclear powerplants are being imported. However, ENUSA already has prior authorization for the construction of a factory that will make it possible to manufacture fuel elements for the light water reactors starting in 1982. The factory's capacity will amount to 300 and 600 tons of uranium by the years 1984 and 1987, respectively.

Storage and Reprocessing of Irradiated Fuel Elements

The annual production of irradiated fuel in the Spanish nuclear powerplants will increase from 20 tons in 1977 to about 300 tons in 1987, thus totaling approximately 1,500 tons of irradiated fuel during the period. To date, the irradiated fuel has been sent to France, in the case of the Vandellós powerplant, and to the United Kingdom, in the case of the Jose Cabrera and Santa Maria de Garona powerplants, for reprocessing. However, the present problems have made a new approach necessary.

The reprocessing of the irradiated fuel elements to recover unburned plutonium and uranium is considered feasible. This view is based on the fact that we, like other countries, cannot dispense with the energy contained in these fuels. Everyone is aware that there are problems at present regarding nuclear proliferation. These problems must be solved, in order to guarantee the peaceful use of plutonium, to take advantage of this energy source.

Summary

In the first place, there is presented a view of the Spanish energy system, with the evolution anticipated over the next 10 years in accordance with the National Energy Plan approved by the Spanish Parliament in July 1979. In this evolution, one can observe the role that nuclear energy will play in the Spanish energy system. Also offered is a list of the nuclear powerplants which are in operation, those which are in a construction period and those with a prior permit from the administration. An analysis is also made of the economic repercussions over the long term (40 years) that would occur on the Spanish economic system by failure to use more nuclear energy than that associated with the level reached by the powerplants that are already under construction or that have a prior permit. The evaluation of these repercussions has been made by comparing two scenarios: In the first one, called Base, the most likely hypotheses are made, leaving freedom to introduce nuclear energy. The second one, called Lin-Nuc, establishes the hypothesis that there will be no building of other nuclear powerplants besides the ones already under construction or with a prior permit. This evaluation shows the sizable increase in costs that result for the energy system, and their interaction with the rest of the Spanish energy system.

The last part of the report shows a view of the current status of the different phases of the nuclear fuel cycle in Spain, as well as their future evolution, based on the implementation of the nuclear energy called for by the National Energy Plan.

Table I

Basic Hypotheses for the Base Scenario

a. General Hypotheses

Discount Rate: 6.0% per year

b. Hypotheses Regarding Resources *

Resource	Import Prices	Restrictions on the international market
Coal	Annual rate of increase for the entire period: 2%	None
Oil	Depends on the period. The average annual rate of increase is 3%	None
Natural gas	Similar to that of oil	None
Uranium	Annual rate of increase for the entire period: 3%	None

* In the Spanish energy system, owing to the high degree of dependence, the hypothesis on international market prices has an extensive effect on the structure of the system.

c. Hypotheses Regarding Capital Costs *

Technology	Investment Costs	Comments
Coal thermal powerplant	\$75 500/kW, availability factor: 65%	Fixed operation and maintenance costs: \$75 17 kW/year
Conventional reactor	\$75 740/kW, availability factor: 65%	Fixed operation and maintenance costs: \$75 20.3 kW/year
Regenerator reactor	\$75 1,100 kW, availability factor: 75%	Fixed operation and maintenance costs: \$75 30.8 kW/year

Reactor in operation: 1.1 MW

Reactors under construction at, with final authorization: 9.5 MW

Reactors which have only prior authorization: 4.9 MW

Total: 15.5 MW

*For the rest of the technologies, the data considered have been those used in the project on system analysis being carried out within the AIE (Research and Development Committee of AIE, January 1980).

Table II

Comparison of Costs Between Scenarios

Year		1990	2000	2010	2020
GDP Estimate (10^9 pesetas/75)		10,200.0	15,600.0	22,000.0	31,000.0
Total cost of the energy system	10^9 pesetas/75	990.0	1,500.0	1,800.0	2,300.0
Base Scenario	% S/GDP	9.6	9.5	8.2	7.4
Total cost of the energy system	10^9 pesetas/75	990.0	1,500.0	1,900.0	2,600.0
Lim-Nu	% S/GDP	9.6	9.6	8.7	8.4
Increase in cost over Base Scenario	10^9 pesetas/75	-	Insignificant	100.0	300.0
	% S/GDP	-	Insignificant	0.5	1.0

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FIFTEEN NUCLEAR POWERPLANTS PROJECTED FOR 1980'S

Madrid LUZ Y FUERZA in Spanish Jan-Feb 81 pp 5, 7, 9, 10

[Article: "Catalonia's Great Nuclear Effort"]

[Text] The high degree of industrialization attained by Catalonia has converted it into one of the areas with the greatest demand for energy. The Catalonian firms: FECSA [Electric Power of Catalonia, Inc], ENHER [Ribagorza National Hydroelectric Enterprise], HECSA [Hydroelectric of Catalonia] and SEGRE have by now virtually constructed the economically profitable hydroelectric facilities in the area, and conventional thermal powerplants have been built to consume the large deposits of lignites and low-grade coal existing in the four Catalonian provinces, in addition to the powerplants fed with fuel oil. However, despite the high degree of electric production that Catalonia has at present, 17.8 billion kwh in 1979, the area's electric consumption in 1979 required a supplement of 2.403 billion kwh sent to it by the other Spanish provinces, thanks to the integrated transportation facilities of the Peninsular Electric System, which make it possible to transfer energy among the areas of Spain on a very stable basis.

Hence, Catalonia, which in 1979 produced on its own 17.38 percent of the electricity generated in Spain, was more or less totally aware of the need to resort to the nuclear option. Moreover, the fact that some sources of electricity are depleted, while the water resources are necessarily limited, and other sources, such as oil have become expensive to prohibitive extremes, prompted the Catalonian electric companies to give timely consideration to types of energy for substitution, as has occurred elsewhere in Spain. And among them, the one with the most immediate use and the greatest experience in the world is nuclear energy, with 30 years of on site testing of the nuclear electric facilities.

It was, in fact, a Catalonian, Juan Alegre Marcet, head of Electric Power of Catalonia and currently also president of Electric Unit, Inc, an entity which coordinates Spain's overall electric system, who remarked, concerning this nuclear option and when the sector had definitely become inclined toward nuclear energy, with the construction of three nuclear electric powerplants which went into service in 1968, 1971 and 1972, that, "The electric sector is the only one capable of making, during the next 15 or 20 years (he was speaking in 1979), the partial substitution of oil by nuclear energy in the aforementioned period of time."

Of the three nuclear powerplants generating electricity in Spain: Jose Cabrera, since 1968, Santa Maria de Garona, since 1971, and Vandellos, since 1972, one was built in Tarragona, in the heart of Catalonia. This means that the Catalanian electric companies had a clear insight into the need to resort to nuclear energy in order to maintain an effective electric service such as the one offered by the electric sector. It is well understood that Catalonia definitely needed to resort to nuclear powerplants because, as we have said, the electrical consumption of the four provinces was suffering from a major deficit in the peninsular electrical exchange. That first powerplant at Vandellos, in which the Catalanian companies participated with EDF [French Electric Power Company], was soon followed by the splendid accomplishment offered today by the four major nuclear powerplants that were built in Catalonia, not to mention a fifth powerplant also located in Vandellos which ranks in the portfolio of studies and projects capable of being achieved.

The Vandellos nuclear powerplant, Vandellos I, located 40 kilometers from the Tarragona capital, was connected to the Catalanian network on 6 May 1972, and will soon be 9 years old. It has a power of 500 kw, and was the result of Spanish-French cooperation which materialized in the Spanish-French Nuclear Energy Company, SA (HIFRENSA), with the participation of FECSA, ENHER, HECSA and SEGRE which, among the four, have a participation of 75 percent, while the French state company, French Electric Power Company (EDF), holds the remaining 25 percent of the capital.

Vandellos I generates about 3.500 billion kwh per year and, since its entry into service, has supplied the national network with some 25 billion kwh, 25 percent of which have been transferred to France through the Vich interconnection in the Pyrenees primarily. (By virtue of the agreement establishing HIFRENSA, each year it receives over 800 million kwh generated by Vandellos I.)

Naturally, the electric sector established a plan for the future in a timely manner, associated with the nuclear option; and the companies designed and built other nuclear powerplants after those opened in 1968, 1971 and 1972. There are currently seven powerplants soon to be connected with the electric network or in an advanced stage, with a combined total power of 6.555 million kw. Many of them will go into service before 1983, and some, like Almaraz I, will do so at a date very close to that of the publication of this issue of LUZ Y FUERZA. But, apart from these seven powerplants, the seven powerplants, the "magnificent seven" because they have begun a period with power amounting to over 900,000 kilowatts, there are in various stages of construction, but already given final authorization, another five powerplants, which will be completed when they receive the final authorization confirming the prior authorization given now for an additional three nuclear powerplants; thereby making a total of 15 nuclear electric powerplants under construction in Spain.

Now then, of these 15 new nuclear powerplants that Spain will have before the end of the 1980's, Catalonia designed four: Asco I and II, and Vandellos II and III. The first of them, Asco I, is being built exclusively by FECSA, with a power of 930,000 kw. It was planned to go into service by 1981, but this date will be moved ahead for reasons quite applicable to the other powerplants, all victims of administrative-political indecision and lack of understanding, which are extremely detrimental to the national electrical service. The Asco II powerplant is being built by the four Catalanian firms: FECSA and ENHER, each with a participation of 40 percent; HECSA, with 15; and SEGRE, with 0.05. Each of the groups, both Asco

and Asco II, has a capacity to produce 6 billion kwh per year. Asco II's connection with the network had been planned for 1982, but it will have to wait somewhat longer for the same reasons that are affecting all the nuclear powerplants under construction in Spain.

The final authorization recently noted for Vandellos II, a 930,000 kw powerplant in which ENHER's participation is 0.54 percent, HECSA's is 0.29 percent, SEGRE's is 0.10 percent and FECSA's is 0.08 percent, while awaiting Vandellos III, which FECSA is building exclusively on its own, completes the picture of Catalonian nuclear powerplants that are essential to meet the future consumption for a region of Spain. The rates of increase in the Catalonian demand for electricity, even while admitting a decline in the rate for the past few years, guaranteed Catalonia a doubling of the demand for electricity every 10 years, which applied until 1979.

Vandellos II and III

In 1977, the four major Catalonian firms signed the pertinent contract with the suppliers, Westinghouse and Bazan, for the construction of the second nuclear powerplant in Vandellos, adjoining the one currently in production. This new powerplant which, as we have just said, has been authorized definitively, will have a pressurized water reactor with 950,000 kw, of the same type as those installed in Asco, Almaraz and Lemoniz. The time planned for this new Vandellos powerplant to go into service has been delayed considerably, owing to the causes which have been reiterated and untiringly enumerated by the electric companies building nuclear powerplants. Vandellos produces some 6 billion kwh per year.

This Vandellos II powerplant is being constructed by the Vandellos Nuclear Association, comprised of the four Catalonian powerplants with the proportion of participation that we have noted (ENHER, 54 percent, HECSA 28, FHS 10 and FECSA 8); its engineering is being handled by the association of firms made up of the Spanish company AUXIESA and the Bechtel Power Company; and the investment planned for its construction, which has become far larger with the passage of time, is distributed as 12 percent for engineering and management, 25 percent for the turbogenerator, 25 percent for construction work, 30 percent for materials, assembly and equipment and 8 percent reserved for fuel load.

Work has been under way at Vandellos II since 1977, with prior authorization granted. Over 2,000 workers are participating in the construction, and it has been estimated that over 150,000 cubic meters of concrete, 70 kilometers of piping and 1,000 kilometers of cable will be required, as well as equipment of highly diversified origin and of various types. The weight of the containment building, including equipment, will be about 65,000 metric tons, a weight quite similar to that of a large modern aircraft carrier. The savings that the replacement of fuel with enriched uranium will represent will be about 4.5 billion pesetas per year. With new authorization, it will be followed by Vandellos III, with the same power and features as Vandellos II, designed exclusively by FECSA; and under construction at present next to the other two Vandellos powerplants are Asco I and II.

The two units comprising the Asco I and II nuclear powerplants are located in the province of Tarragona, 55 kilometers from the capital as the crow flies. The first

group, Asco I, is in a very advanced stage of construction, and is the property of FECSA; the second group, Asco II, owned by ENHER, HECSA, SEGRE and FECSA, is also in an advanced phase of construction and, although it cannot be connected with the network by the anticipated time, 1981-82, it is expected to be able to do so in 1982-83, if the political-labor factors stop hampering its construction. Each of the powerplants occupies floorspace measuring about 200 by 150 meters, where most of the main construction is located, such as the reactor building, and those for control, fuel, turbine, etc.

Each group consists of a pressurized water type reactor (PWR), with a gross power of 930 MWe, and the cooling is carried out with water from the Ebro River, using supplementary cooling and discharge towers.

Upon the start of the construction, the budget of both Asco groups amounted to about 60 billion pesetas, although the final cost of the project, burdened by factors beyond the control of the firms, will total considerably more. In any event, once the two Asco facilities, I and II, are in operation, they will provide the network with 12 billion kwh per year, which is more than a tenth of the production accrued by the electric sector in 1980.

The two fundamental systems of both groups are basically the steam generation nuclear system and the electric generation system. The first, generally known as NSSS, consists of a pressurized water reactor, a reactor cooling system and the associated auxiliary systems. The reactor cooling system is comprised of three closed loops connected in parallel fashion with the reactor vessel, each having a reactor cooling pump and a steam generator; and connected to one of the loops is an electrically heated pressurizer. The second fundamental system of the powerplant, the electrical energy generating system, is made up essentially of the turbine, the generator, the condenser and the heating circuits of the feed water condenser.

One of the main features of Asco I and Asco II is the cooling. The water for the cold source of the cooling is taken by Asco from the Ebro River and, after circulating in the condensers, is taken directly through cooling towers to a mixing pool, from which it can be returned to the river or recirculated to the condenser. This water for cooling does not come in contact with the core of the reactor, but is insulated from it by two consecutive insulated circuits, the secondary circuit and the primary circuit. Part of the water from the river is used to cool various components of the powerplant, but in any case it is separated from potential contaminated elements by at least two consecutive closed circuits.

The concession of water for cooling at the Asco Nuclear Powerplant was made by the General Directorate of Water Works on 28 June 1977, and includes 33 conditions imposed by highly restrictive clauses, in order to guarantee the absence of harmful effects on the river, both with regard to the thermal and the radioactive aspects.

The maximum increase in temperature acceptable in the waters of the river will be 3 degrees centigrade, in any case, gaged by the difference between the temperature that exists in the water circulating through the intake conduit at a depth of 1 meter, as a minimum, and the maximum temperature of the water in the river bed in a section located beneath the spilling point at which the atomic dispersion might be considered checked.

A continuous temperature control system, which includes the intake, discharge conduit and point at which the dispersion is checked, will make it possible to oversee compliance with the regulations.

The cooling towers will divert part of the heat into the atmosphere, to limit the increase in heat in the river to the amounts stipulated in the concession. The system is designed to operate using different methods, depending on the river bed and the power produced by the plant. For river volumes of flow exceeding 288 cubic meters per second, there is in effect the condition of 3 degrees centigrade without a need for the cooling towers, something that will occur two thirds of the year, according to the experience gained over the past 10 years. For volumes of flow less than 288 cubic meters per second, the cooling towers would be put into operation.

If it should prove necessary, for lower volumes of flow, there is a possibility of increasing the runoff discharged from the towers by recirculating part of the water. The very restriction of the increase in temperature to 3 degrees centigrade necessitated the construction of the cooling towers which, with their associated construction, entailed an additional investment of 700 million pesetas.

Report on the Safety of the Asco Nuclear Powerplant

The Joint Commission of the Generalitat and Mayors of the Municipalities of the Asco area has disseminated a memorandum on the activities carried out by it to date. As may be recalled, on 8 July of this year a Joint Commission of the Generalitat and Town Halls of the Asco area was set up to find solutions and to oversee compliance with conditions relating to the Asco nuclear powerplant. The Joint Commission consists of the mayors of the leading localities of the Asco-Asco area, and the l'Espanyol, Flix and Vinebre country estate, as well as the head of the Inter-District Council of Ebro Land, and the general directors of the departments of industry and energy, agriculture, government, health and social security, and policy and public works of the Generalitat. The representatives of the Generalitat, as stated verbatim in the memorandum, "act on the basis of a moral imperative, with responsibility freely assumed with respect to the population concerned."

Since the day of its founding, the commission has held six meetings, and the topics primarily discussed were the following: urban development and siting, quality control, level of radioactivity in the vicinity of the powerplant, cooling water intake, impact on agriculture and a general consideration of the group of legal measures and provisions to be taken into account. Owing to factors related to urgency and operations, the joint commission decided to focus on matters involving Asco I, and later proceed to study group II of the same powerplant.

The issues which have most concerned the local mayors have been concentrated on whether or not there is an emergency plan in the event of an accident, and also on whether there is any nuclear risk insurance now that the nuclear fuel has been stored. The firm responsible for the Asco I nuclear powerplant has answered these questions stating that an internal emergency plan for the powerplant has been completed, and that the insurance for civil liability assigned to third parties for nuclear fuel storage has also been provided for, in accordance with the legislation currently in effect.

The joint commission considered the emergency plan for the civilian population devised by the company to be inadequate, and therefore contacted the latter, which expressed complete willingness to prepare a new proposal for an emergency plan involving the areas contingent upon it, and to cooperate unconditionally in the areas which are not within its jurisdiction. With regard to this same issue, the joint commission made an inquiry of the Nuclear Energy Board, which was answered verbally by its head, to the effect that, "The level of risk from the storage of nuclear fuel does not necessitate the existence of an emergency plan," according to the memorandum from the joint commission.

As for the topics of urban development and siting, the joint commission expressed the opinion that, at the time, the Town Hall had acted properly and in accordance with its authority and the legislation currently in effect. The issue stands as follows at the present time: The owners of the powerplant resorted to an administrative suit, wherein the decision was in their favor; and the Town Hall, in turn, brought the matter before the Supreme Court, which has not yet decided on the case. The commission has requested the pertinent report on the legal situation that could occur in the event that the permit for operating the powerplant were to be granted for its entry into service before the Supreme Court had decided on the urban development issue.

With regard to the foundation of the Asco I nuclear powerplant, the commission has studied various reports that do not indicate any rational sign of problems with it. As for quality control, the joint commission has requested of the plant owners a report on its current status, as well as an index of documentation produced and transmitted to the Nuclear Energy Board, documentation which has by now been submitted and is being studied at the present time.

Nuclear Powerplants Under Construction (prior authorization and authorization for construction granted, as noted in the National Energy Plan)

Powerplant	Owners	Standard Power (MW)	Date of Entry Into Service
Almaraz I	1/3 H. Espanola 1/3 Cia Sevillana 1/3 Union Electrica	930	1978/79
Almaraz II	1/3 H. Espanola 1/3 Cia Sevillana 1/3 Union Electrica	930	1979/80
Lemoniz I	Iberduero	930	1979/80
Asco I	FECSA	930	1980/81
Lemoniz II	Iberduero	930	1981/82
Asco II	0.4 FECSA 0.4 ENHER 0.15 HECSA 0.05 SEGRE	930	1981/82

Powerplant	Owners	Standard Power (MW)	Date of Entry Into Service
Cofrentes	H. Espanola	975	1982/83
Total Power:		6,555	

Nuclear Powerplants With Prior Authorization Granted

Powerplant	Owners	Standard Power (MW)
Vandellos II	0.08 FECSA 0.54 ENHER 0.28 HECSA 0.10 SEGRE	950
Valdecaballeros I	1/2 H. Espanola 1/2 Cia Sevillana	975
Trillo I	0.6 Union Electrica 0.2 ERZ 0.2 Eiasa	1,032
Sayago	Iberduero	1,070
Valdecaballeros II	1/2 H. Espanola 1/2 Cia Sevillana	975
Regodola	0.6 Fenosa 0.2 H. Cantabrico 0.2 E. Viesgo	930
Vandellos III	FECSA	950
Trillo II	0.6 Union Electrica 0.2 ERZ 0.2 Eiasa	1,032

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